Total Elbow Humeroradial Revision as a Salvage Procedure

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TEA Indications

- Rheumatoid arthritis
- Primary osteoarthritis
- Fracture*
- Posttraumatic osteoarthritis
- Chronic Instability

Increasing and Changing Utilization

- 3X increase in TEA in US[1]
- 2x increase in TEA in Germany
    - 45 % patients under 70 years old[2]
- 1996-2007 New York State
    - Trauma 43% to 69% of total TEA utilization
    - RA 48 to 19% of total TEA utilization[3]

1-Day et al, J Shoulder & Elbow Surg, 2010.
2-Klug et al, Int. Orthop., 2018.
3-Gay et al, JBJS, 2012.

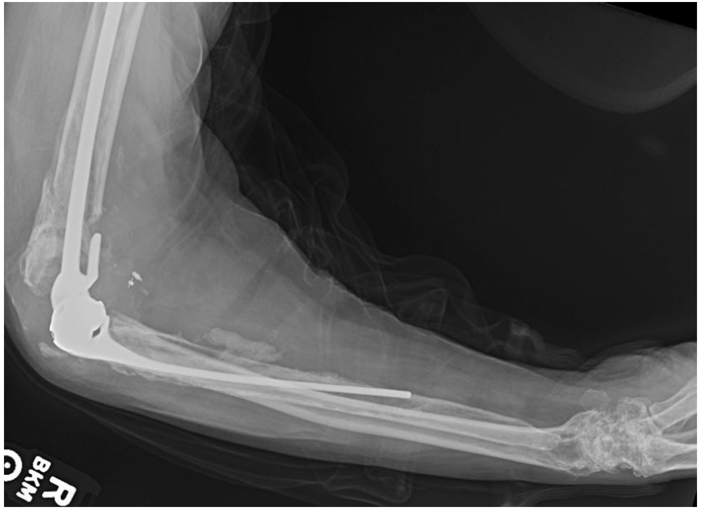
Complications

- Complication rates ranging from 10-25%[4-5]
- Aseptic loosening-7%-15%.[4]
- Infection-3-8%[5]
- Ulnar nerve neuropathy-10.4%[4]
- Periprosthetic fractures 2-3%[6]
- Revision rate of 5.08 per 100 observed components (highest of any arthroplasty)[7]

3. Gschwend, J Shoulder & Elbow Surg, 1996.
4. Park, JSES 2013
5. Kasten, CORR, 1993.
6. Welsink, JBJS, 2017.
7. Labek, JBJS, 2011.

Problems Encountered in Revision

- Ulnar bone loss
- Etiologies:
  - Deep infection
  - Osteolysis/component loosening
  - Periprosthetic ulnar fracture (trauma or intraoperative)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Traditional Solutions for Ulnar Bone Loss

- Allograft-prosthesis composite
  - 30% infection rate[8]
- Custom long stem prosthesis +/- allograft
  - 36% complication rate[9]
- Resection arthroplasty
  - 47% reoperation rate[10]
  - 24% wound healing complications[10]

8. Mansat, JBJS, 2004.
9. Kamineni, JBJS, 2004.
10. Zarkadas, JBJS, 2010.

Humeroradial Revision

Retrospective review

N - 6 patients

- 2 trauma, 1 post traumatic arthritis, 3 RA
- 3 aseptic loosening, 3 PJI

Figure 1: Angled AP Views of Patient PP 7 Years After Primary TEA for Rheumatoid Arthritis (Mayo 60, DASH 75)

Figure 2: Cross-Table Lateral View of Patient PP 7 Years After Primary TEA for Rheumatoid Arthritis

Humeroradial Revision

6 patients

- Stable
- DASH/MEPS

- No acute complications
- 2 long term complications
    - Polyethylene wear
    - Periprosthetic fracture

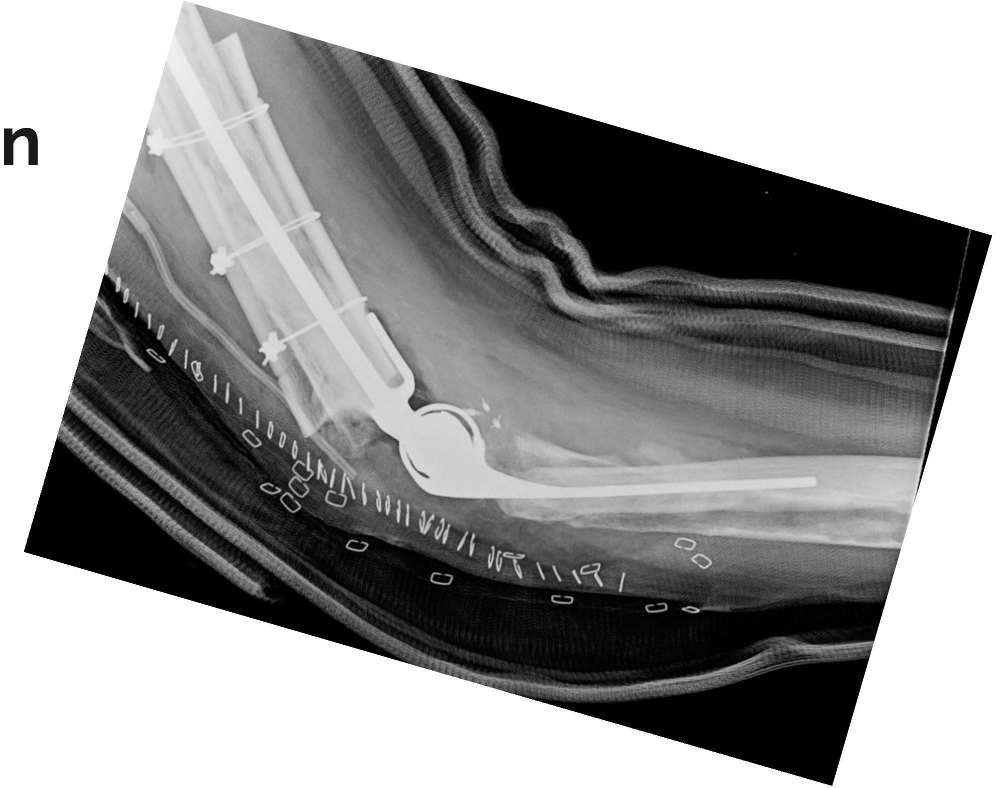

Figure 3: AP View of Patient PP After Humeroradial TEA Revision

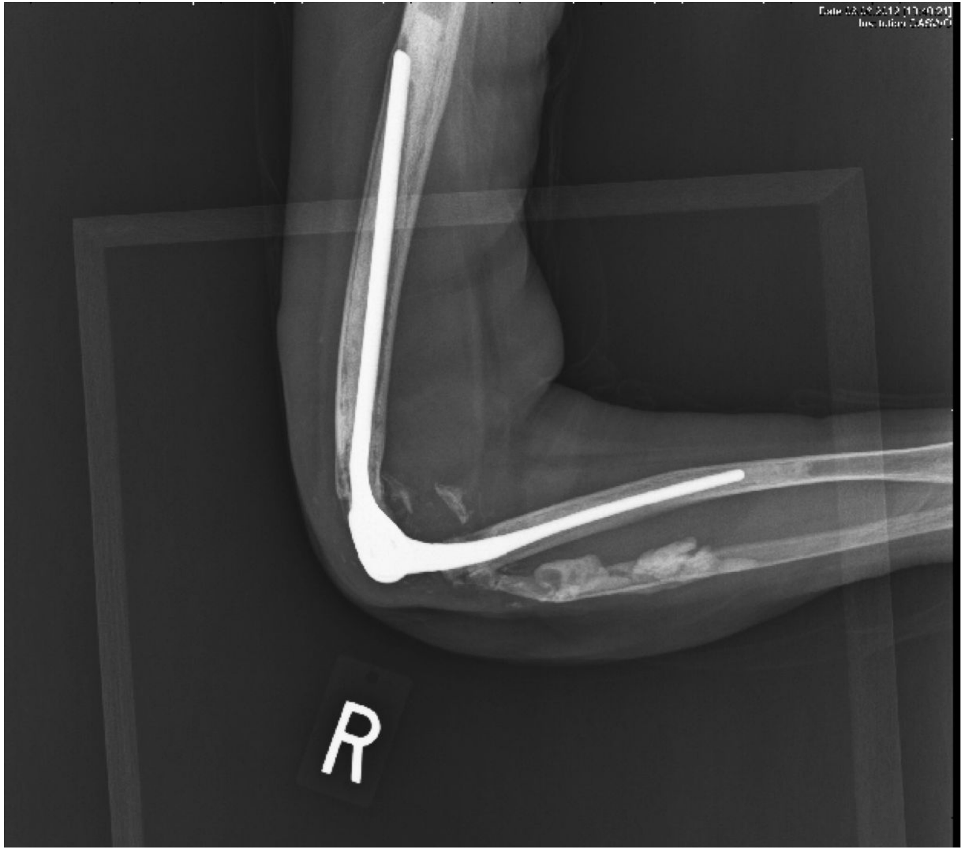

Figure 4: Lateral View of Patient PP After Humeroradial TEA Revision

Patient	DASH Score	Mayo Score	Arc of Motion (degrees)
1	59.48	Good (80)	>100
2	23.15	Excellent (90)	>100
3	18.75	Excellent (100)	>100
4	63.39	Poor (55)	50-100
5	75	Fair (60)	50-100
Mean	**47.95**	**77**	

Table 1: Post Humeroradial TEA Revision DASH and Mayo scores.

Humeroradial Revision

- Previous series: 4 patient series, humeroradial revision produced pain-free, functional elbow[11]

11. Gong, Chinese Medical Journal, 2016.

Surgical Technique

- Due to bow of radius, contralateral instruments may be needed
- While cement cures, elbow extension with slight forearm pronation
- Reattach remaining triceps to surrounding fascia

Conclusion

- With rise of TEA utilization, complications have risen as well
- Complex revision scenario calls for various options
- In face of severe ulnar deficiency, humeroradial revision is a viable option

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1. Day, J. S. *et al.* Prevalence and projections of total shoulder and elbow arthroplasty in the United States to 2015. *J. Shoulder Elbow Surg.* 19, 1115–1120 (2010).
2. Klug, A. *et al.* Trends in total elbow arthroplasty: a nationwide analysis in Germany from 2005 to 2014. *Int. Orthop.* 42, 883–889 (2018).
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7. Kamineni, S. & Morrey, B. F. Proximal ulnar reconstruction with strut allograft in revision total elbow arthroplasty. *J. Bone Joint Surg. Am.* 86-A, 1223–1229 (2004).
8. Zarkadas, P. C. *et al.* Long-term outcome of resection arthroplasty for the failed total elbow arthroplasty. *J. Bone Joint Surg. Am.* 92, 2576–2582 (2010).
9. Gong, M.-Q., Jiang, J.-L., Jiang, X.-Y., Zha, Y.-J. & Li, T. Inserting the Ulnar Prosthesis into Radius as a Novel Salvage Surgery for Revision Total Elbow Arthroplasty with Massive Bone Defect. *Chin. Med. J.* 129, 1917–1921 (2016).

Questions?

Thank You